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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,742	12/09/2003	Atul Kelkar	502469	5109
53609 7590 01/11/2007 REINHART BOERNER VAN DEUREN P.C. 2215 PERRYGREEN WAY ROCKFORD, IL 61107			EXAMINER OCHOA, JUAN CARLOS	

ART UNIT	PAPER NUMBER
2123	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/731,742	Applicant(s) KELKAR ET AL.	
	Examiner Juan C. Ochoa	Art Unit 2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>12/09/03</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1–16 are presented for examination.

Drawings

2. The drawings are objected to because Fig. 10 is non-existent. Page 5, paragraph [0025] and page 34, paragraph [0034], line 4 of the specification refer to "Fig. 10".

Claim Objections

3. Claims 6, 7, 13, and 15 are objected to because of the following informalities:
4. In claims 6 and 7, line 2, the term "~" may be interpreted as the relative term "about" which would render the claims indefinite. See relative terminology in MPEP 2173.05 (b). Examiner interprets "~" as "=" for examination purposes.
5. Claim 13 line 2 includes the misspelled term "fro". Examiner interprets as "from" for examination purposes.
6. Claim 15 line 2 includes the misspelled term "close-loop". Examiner interprets as "closed-loop" for examination purposes.
7. Claims 3–7 use several acronyms or variables, the first use of an acronym or variable in a claim should be defined to avoid any possible indefiniteness issues.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1–16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted step is: extracting acoustic energy and structural energy.
10. Claim 1, as written, fails to perform the method set forth in the preamble. The limitation “a resulting closed-loop response provides a desired noise reduction” does not reflect the intended use “extracting acoustic energy and structural energy”.
11. Claims 2, 13, and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
12. As to claim 2, the term “checking robustness” in line 1 is a relative term, which renders the claim indefinite. The term “robustness” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.
13. As to claim 13, the term “perturbed from nominal values” in line 3 is a relative term, which renders the claim indefinite. The term “perturbed” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

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14. As to claim 14, the term "response is satisfactory" in line 3 is a relative term which renders the claim indefinite. The term "satisfactory" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

15. Dependent claims inherit the defect of the claim from which they depend.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

18. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were

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made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

19. Claims 1, 2, and 10–16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelkar and Joshi, (Kelkar hereinafter), Robust Passification And Control Of Non-Passive Systems, (see IDS dated 12/09/03), taken in view of Son et al., (Son hereinafter), Stabilization Of Linear Systems Via Low-Order Dynamic Output Feedback: A Passification Approach.

20. As to claim 1, Kelkar discloses a method to design a feedback controller (see “iterative controller design” in page 3136, col. 2, 2nd paragraph, lines 1–8) for extracting acoustic energy and structural energy in an acoustic enclosure comprising the steps of: obtaining a continuous-time multi-input multi-output (see page 3134, col. 1, 2nd paragraph, lines 10–12) state-space mathematical model (see page 3134, col. 1, 2nd paragraph, lines 1–4) of the acoustic enclosure; and checking passivity of the compensated system (see page 3136, col. 2, 2nd paragraph, lines 1–8).

21. While Kelkar discloses a method to design a feedback controller, Kelkar fails to disclose designing compensation to render the mathematical model passive and designing a passivity-based controller such that a resulting closed-loop response provides a desired noise reduction.

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22. Son discloses designing compensation to render the mathematical model passive in accordance with mathematical system theory if the mathematical model is not passive, thereby forming a compensated system that is passive (see page 3822, col. 2, lines 5–11) and designing a passivity-based controller such that a resulting closed-loop response provides a desired noise reduction (see page 3825, col. 2, 3rd paragraph).

23. Kelkar and Son are analogous art because they are both related to passification and active noise control.

24. Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the steps of Son in the method of Kelkar because Son renders a linear time-invariant (LTI) system passive and stable via dynamic output feedback (see page 3822, col. 1, lines 1–3), and as a result, Son reports the following improvement over his prior art: dynamic output feedback as passification as well as stabilization that can be solved by using SOF algorithms, e.g. LMI (see page 3826, col. 2, 2nd paragraph).

25. As to claim 2, Kelkar discloses a method further comprising the step of checking robustness of the compensated system (see page 3136, col. 2, 2nd paragraph, lines 1–8).

26. As to claim 10, Kelkar discloses a method wherein the step of designing compensation to render the mathematical model passive comprises the steps of: determining if a feedforward compensation will passify the system; if a feedforward compensation will not passify the system: designing a constant gain feedforward

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compensation to render the compensated system minimum-phase; and rendering the compensated system positive-real by at least one of series compensation, sensor-blending and control allocation (see page 3133, col. 2, last paragraph, lines 17–22).

27. As to claim 11, Kelkar discloses a method wherein the step of designing a passivity-based controller comprises the step of designing one of a dissipative linear-quadratic-Gaussian (LQG) type positive-real controller and a dissipative constant gain positive-real controller (see page 3136, col. 2, 1st paragraph, last 5 lines).

28. As to claim 12, Kelkar discloses a method wherein the step of rendering the compensated system positive-real by at least one of series compensation, sensor-blending and control allocation comprises the step of rendering the compensated system positive-real by at least one of series compensation, feedback compensation (see page 3133, col. 2, last paragraph, lines 7–10), hybrid compensation, and sensor-blending and control allocation.

29. As to claim 13, Kelkar discloses a method further comprising the step of redesigning the compensation if the passivity is not preserved if mathematical model parameters are perturbed from nominal values (see "iterative controller design" in page 3136, col. 2, Concluding Remarks, lines 6–8).

30. As to claim 14, Son discloses a method further comprising the step of performing numerical simulations of the controller in the presence of a simulated broadband disturbance input to determine if the closed-loop response is satisfactory (see page 3825, col. 2, 3rd paragraph).

31. As to claim 15, Son discloses a method further comprising the step of redesigning the controller if the closed-loop response is not satisfactory (see page 3825, col. 2, 3rd paragraph).

32. As to claim 16, Kelkar discloses a method wherein the step of designing compensation comprises the steps of: designing a constant gain feedforward compensation to render the compensated system minimum-phase and rendering the compensated system positive-real by one of sensor-blending and control allocation (see page 3133, col. 2, last paragraph, lines 17–22).

33. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelkar taken in view of Son as applied to claim 1 above, and further in view of Kelkar and Joshi, (Kelkar (2) hereinafter), Robust Passification Via Optimal Sensor Blending And Control Allocation, (see IDS dated 12/09/03).

34. As to claim 8, while Kelkar and Son disclose a method to design a feedback controller, the Kelkar–Son method fails to disclose designing compensation comprises the step of performing sensor blending if there are redundant sensors.

35. Kelkar (2) discloses a method wherein the step of designing compensation comprises the step of performing sensor blending if there are redundant sensors (see page 281, col. 1, 1st paragraph).

36. Kelkar, Son, and Kelkar (2) are analogous art because they are related to passification and active noise control.

37. Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the steps of Kelkar (2) in the Kelkar–Son method because Kelkar (2) considers robust passification for uncertain linear, time invariant systems having redundant actuators and sensors (see page, col. 1, lines 1–3), and as a result, Kelkar (2) reports the following improvement over his prior art: optimization of sensor blending and control allocation matrices to maximize the robust passivity region in the parameter space, offering robust controller design when sufficient actuators and sensors are available (see page, col. 2, 2nd paragraph).

38. As to claim 9, Kelkar (2) discloses a method wherein the step of designing compensation comprises the step of performing control allocation if there are redundant actuators (see page 281, col. 1, 1st paragraph).

Conclusion

39. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

40. Hong et al., (Hong hereinafter), "Modeling, Identification, And Feedback Control Of Noise In An Acoustic Duct" (see IDS dated 12/09/03).

41. Hong discloses a method, claim 11, wherein the step of designing a passivity-based controller comprises the step of designing one of a dissipative linear-quadratic-Gaussian (LQG) type positive-real controller and a dissipative constant gain positive-real controller (see page 3672, col. 2, lines 11–24).

42. Any indication of allowability of the claims not rejected on prior art is being held in abeyance pending the manner in which applicant amends or responds to the above rejections.

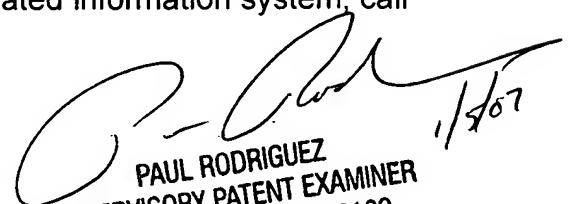
43. Examiner would like to point out that any reference to specific figures, columns and lines should not be considered limiting in any way, the entire reference is considered to provide disclosure relating to the claimed invention.

44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan C. Ochoa whose telephone number is (571) 272-2625. The examiner can normally be reached on 7:30AM - 4:00 PM.

45. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

46. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

1/4/07



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